1 — 64 32

NET	Sites	Univ	Line speeds	Protocols	Countries
ARPANET	40	20	56KB, 9.6KB/VDH	TCP/IP:Mail,FTP,RJE,VT	US
BITNET	60	60	1.2KB	SNA,RSCS:Mail,FTP,RJE,VT	US,Europe,Israel
CSDN(CDC)	100(STAR)		N/A	N/A	US,Europe
CSNET/ARPANET	18	17	56KB, 9.6KB/VDH	TCP/IP:Mail,FTP,RJE,VT	US
CSNET/Phonenet	85	75	1.2-0KB	MMDF:Mail, Mail-based FTP	US,Canada
CSNET/X.25	7	2	9.6KB	X.25/TCP/IP:Mail,FTP,VT,PAD	US
E-NET (Digital)	2K/Internal		56KB, 9.6KB	DNA:Mail,TranspFTP,VT	US,Europe
IBM/IN	Proprietary		56-9.6KB	SNA:Mail,FTP,RJE	US
MFEnet	~20	~10	56-9.6KB		US,Japan
MILNET/Open	175	2	56KB	TCP/IP:Mail,FTP,RJE,VT	US
RCA Cylix	200		1.5MB-56KB	N/A	US,Canada
SATNET	8	1		TCP/IP	US,UK
Telenet(GTE)	1200	N/A	56-9.6KB	X.25,X.29:PAD, Mail	Worldwide
Tymnet	500	N/A		X.25,X.29:PAD	Worldwide
USTS(ITT)	under development				US
UUCP/Usenet	600	200	9.6-0.3KB	UUCP:Mail,Netnews,FTP	Worldwide
Uninet	125	N/A		X.25,X.29:PAD	US
Xerox Internet	1K/Internal		10MB-56KB	Grapevine:Mail	US

Key to Services

Mail	Electronic Mail
FTP	File Transfer
TranspFTP	File Transfer Transparency
VT	Remote Access(Host-to-Host)
RJE	Remote Job Entry
PAD	Public Dialup/Remote Access
TCP	Transmission Protocol, DoD Standard
IP	Internet Protocol (Datagram)
X.25	Transmision Protocol, ISO Standard (Virtual Circuit)
X.29	Terminal Access Protocol, ISO Standard
UUCP	Unix-Unix Copy Protocol
SNA	System Network Architecture, IBM Protocol
DNA	Distributed Network Architecture, DEC Protocol
MMDF	Multi Memo Distribution Facility, Mail Protocol
Grapevine	Xerox Mail Protocol

Arpanet

CTR SEISMIC ST	25	seismo (UUCP/Usenet Gateway)
DIGITAL	79	dec-tops20 dec-marlboro
HONEYWELL	80	hi-multics
KESTREL	32	kestrel
XEROX	32	parc-maxc parc-gw
DoD	20	dcec-itel dcec-gateway edn-unix dcec-psat
DoD	38	bragg-gwyl bragg-stal bragg-tac net-5-gateway
DoD	80	sacl-tac sac-gateway
DARPA	28	arpa3-tac ipto-gw
NSF	49	csnet-relay
NSF	82	csnet-sh

CONTROL DATA SERVICES OVERVIEW

Control data is a leader in providing Remote Computing Services in the United States and in most major locations throughout the world. These services provide applications in a variety of disciplines including manufacturing, utilities, petroleum, business, engineering, and scientific areas.

Heavy emphasis is placed on support of the scientific community and research activities through providing service on over 40 large scale scientific/engineering oriented computer systems worldwide. Included is the CYBER 200 Service, featuring CYBER 205 supercomputer access throughout the U.S., Canada, and West Europe.

Access to the Control Data services system is provided by communications network offering conversational, remote job entry, and mainframe links at speeds of up to 56kb for users and satellite links for transoceanic network connections.

These communications networks are utilized primarily as private networks to provide access for data services customers to our remote computing facilities. The capabilities exist, however, to allow other hosts to interface to our network via mainframe to mainframe links. These hosts then have available for their use our entire network of systems and full range of services.

VAN/Resale Communications Services

1. Do you currently offer a digital data service, or do you plan to offer such a service?

Response: It is assumed that "digital data service" refers to a data communications service. Control Data procures telecommunications links from the common carriers. Many of these facilities are used directly by customers to access Control Data's large data services computer mainframes, however Control Data also operates a large packet switching network for the majority of its interactive access. This packet network, called the Control Data Shared Network, or CDSN, provides broad coverage throughout the U.S. as well as Canada, West Europe, Japan, and Australia.

The CDSN initially provided service only to Control Data's data services customers, linking their terminals to the data services mainframes. The CDSN is now additionally being offered as a network service where a customer may connect his mainframe and then access the mainframe from terminals, using the CDSN.

2. When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year?

Response: The CDSN has been in existence for about ten years in its use of providing access to Control Data's data service mainframes. It was introduced as a pilot network services offering during 1983. There are presently two network customers, and a nominal growth is anticipated in 1983.

3. Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration.

Response: The present service uses satellite facilities within the network on its overseas links as provided by the common carriers. Optical fiber facilities will be employed as common carriers begin to use them.

The configuration of the network is a star shape with a major node in the U.S. plus approximately 100 minor nodes (mini-computers). Host mainframes and terminals connect to the minor nodes either directly or through statistical multiplexers which are attached to the minor nodes.

4. Is the service packet switched, circuit switched, or both?

Response: The CDSN uses packet switched technology and allows a terminal user to logically connect himself, or route himself, to any host mainframe on the network.

5. Is a bit rate of 1.5 Mb/s attainable?

Response: No

6. If not, do you plan to offer up to 1.5 Mb/s? When?

Response: Bit rates as high as 1.5 Mb/s are not presently used. As the demand for these higher speeds develop, Control Data will provide the service where cost effective. For example, a 1 Mb/s link is planned for delivery in France during 1984 between a Control Data computer center and a customer's mainframe using France's TRANSMIC network offering. This is being implemented outside of the actual CDSN but represents an example of Control Data's experiences in this area.

It should also be pointed out that the CDSN is used primarily for interactive links from lower speed asynchronous ASCII terminals. Remote batch capabilities are present in the CDSN but are not marketed in the U.S. at this time. The megabit speeds would obviously be used in remote batch or mainframe-to-mainframe links.

7. What would be the cost of configuring your existing system for 1.5 Mb/s service?

Response: The cost of configuring for 1.5 Mb/s service has not been determined.

8. Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions).

Response: The CDSN uses packet switched technology and involves the intelligent functions listed. The minor nodes interface to the various terminals, speeds, and protocols, packetizing the data and performing flow control and error checking. The major nodes control the logical connections and routing, collect usage statistics, downline load the minor nodes, and perform other network supervisory functions.

9. What are the error rates for the service?

Response: Uncorrected errors within the network have been determined to be less than 1 in 10 to the 14th power.

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access?

Response: The majority of the access to the CDSN is achieved through public dial-up, as it is the most cost effective method of sharing the network resource. Private dial-up and dedicated access are also available at fixed monthly costs, providing unlimited usage.

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number?

Response: Most public dial-up is provided through a local number, and an 800 number is used to cover areas of the U.S. where there is low usage.

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port?

Response: See the front page of the attached CDSN "Service and Price Schedule" under the section labeled "Private Terminal Access Ports (Monthly Service)".

13. Is the service available nationwide? If not, please list major cities where the service is available.

Response: Enclosure 1 of the attached CDSN "Service and Price Schedule" lists over 200 U.S. cities where local dial-up service is available.

14. Will nationwide service be available at a future date? When?

Response: (Not applicable)

15. Is your service charge computed on a usage basis?

Response: Charges for public dial-in terminal access is computed on a connect time basis as described in the attached price schedule. Private terminal access and host computer network interface is charged on a monthly basis.

16. If only fixed monthly charge service is available, would you consider charging on a usage basis with guaranteed minimum fees or other conditions.

Response: Any deviations from the attached "Service and Price Schedule" would have to be negotiated.

17. What is the installation charge associated with the service?

Response: Installation charges are defined in the attached CDSN "Service and Price Schedule" for private terminal access ports and for host computer network interface.

18. How does distance affect service charges?

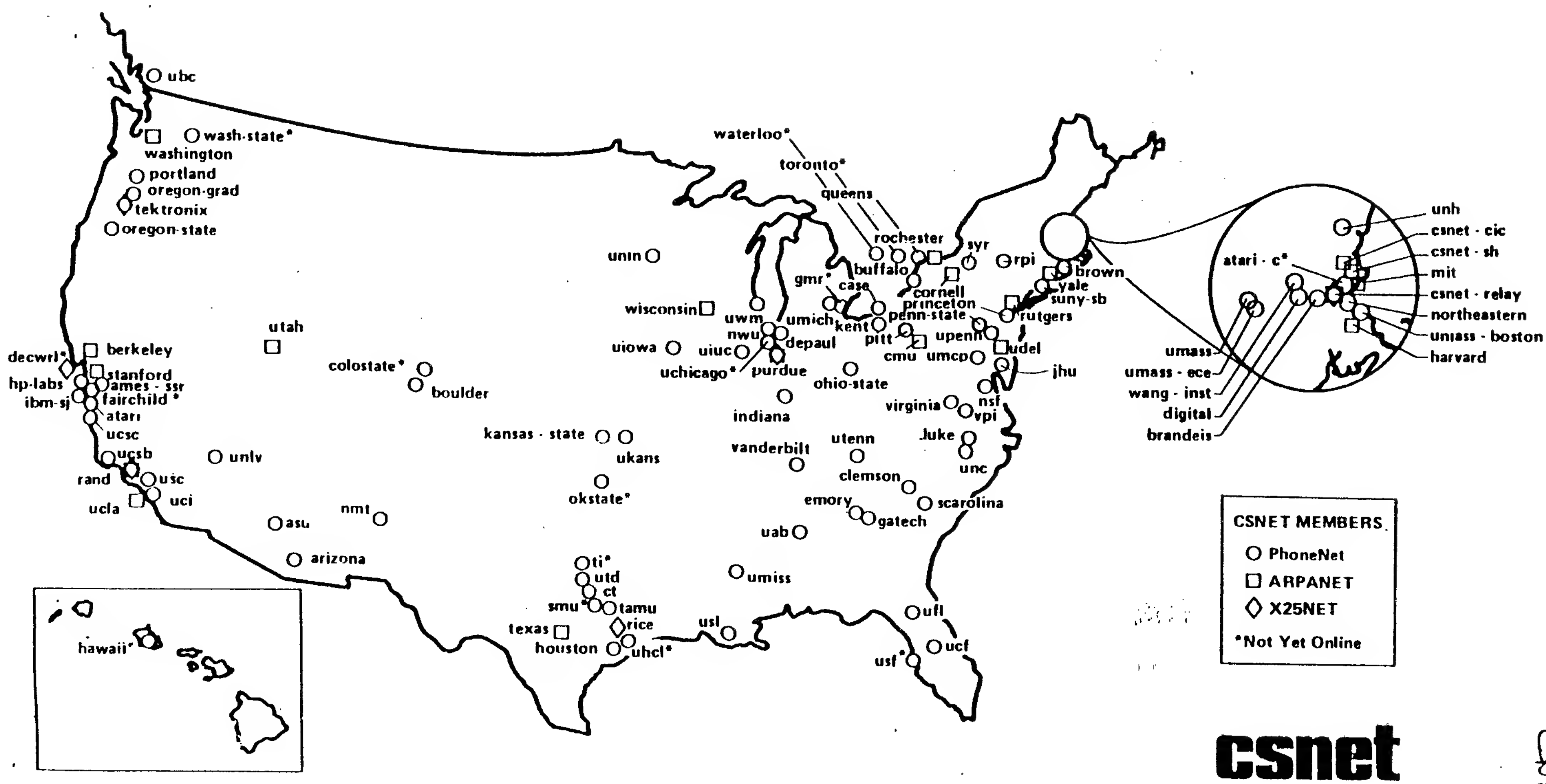
Response: The service charges for terminal connect time are not distance sensitive. Host connections from cities outside of those listed in Enclosure 2 of the attached price schedule will be charged at the rate assessed by the common carrier for mileage beyond 100 miles.

19. How do the rates for your service compare with the rates for services offered by vendors who own their own facilities?

Response: The rates for our service compare very favorably to that of other vendors.

1115d-C

GEOGRAPHIC MAP, DECEMBER 1, 1983



CSNET

CSNET

CSNET SITES AS OF 1 DECEMBER 1983
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* not yet online
+ change since 1 December 1983 (date of last map)

PhoneNet Sites by Relay (official host names or aliases)
---

at csnet-relay

atari-c*	Atari - Cambridge, MA
brandeis	Brandeis University - Waltham, MA
brown	Brown University - Providence, RI
digital	Digital Equipment Corporation - Marlboro, MA
northeastern	Northeastern University - Boston, MA
nsf	National Science Foundation - Washington, D.C.
pitt	University of Pittsburgh - Pittsburgh, PA
queens	Queen's University - Kingston, Ontario, Canada
rpi	Rensselaer Polytechnic Institute - Troy, NY
suny-sb	SUNY at Stony Brook - Stony Brook, NY
syr	Syracuse University - Syracuse, NY
toronto*	University of Toronto - Toronto, Ontario, Canada
umass-boston	University of Massachusetts at Boston - Boston, MA
umass	University of Massachusetts at Amherst - Amherst, MA (Dept. of Computer & Info. Sciences)
umass-ece	University of Massachusetts at Amherst - Amherst, MA (Dept. of Electrical & Computer Engineering)
umcp	University of Maryland - College Park, MD
umich	University of Michigan - Ann Arbor, MI
unc	University of North Carolina - Chapel Hill, NC
unh	University of New Hampshire - Durham, NH
uwm	University of Wisconsin at Milwaukee - Milwaukee, WI
virginia	University of Virginia - Charlottesville, VA
wang-inst	Wang Institute of Graduate Studies - Tyngsboro, MA
waterloo*	University of Waterloo - Waterloo, Ontario, Canada

at rand-relay

ames-ssr	NASA Ames Research Center - Moffett Field, CA
arizona	The University of Arizona - Tucson, AZ
asu	Arizona State University - Tempe, AZ
atari	Atari - Sunnyvale, CA
boulder	University of Colorado at Boulder - Boulder, CO
buffalo	SUNY at Buffalo - Amherst, NY
case	Case Western Reserve University - Cleveland, OH
clemson	Clemson University - Clemson, SC
colostate*	Colorado State University - Ft. Collins, CO
ct	Computer Thought Corporation - Plano, TX
depaul	DePaul University - Chicago, IL
duke	Duke University - Durham, NC
emory	Emory University - Atlanta, GA
fairchild*	Fairchild Laboratory for Artificial Intelligence Research - Palo Alto, CA
gatech	Georgia Institute of Technology - Atlanta, GA
gmr*	General Motors Research Labs - Warren, MI
hawaii*	University of Hawaii at Manoa - Honolulu, HI
houston	University of Houston - Houston, TX

hp-labs	Hewlett Packard - Palo Alto, CA
ibm-sj	IBM Research - San Jose, CA
indiana	Indiana University - Bloomington, IN
jhu	Johns Hopkins University - Baltimore, MD
kansas-state	Kansas State University - Manhattan, KS
kent	Kent State University - Kent, OH
nmt	New Mexico Tech - Socorro, NM
nwu	Northwestern University - Evanston, IL
ohio-state	Ohio State University - Columbus, OH
okstate*	Oklahoma State University - Stillwater, OK
oregon-grad	Oregon Graduate Center - Beaverton, OR
oregon-state	Oregon State University - Corvallis, OR
penn-state	Pennnsylvania State University - University Park, PA
portland	Portland State University - Portland, OR
princeton	Princeton University - Princeton, NJ
scarolina	University of South Carolina - Columbia, SC
smu*	Southern Methodist University - Dallas, TX
tamu	Texas A&M University - College Station, TX
tektronix	Tektronix - Beaverton, OR
ti*	Texas Instruments Corporation - Dallas, TX
uab	University of Alabama at Birmingham - Birmingham, AL
ubc	University of British Columbia - Vancouver, British Columbia, Canada
ucf	University of Central Florida - Orlando, FL
uchicago*	University of Chicago - Chicago, IL
uci	University of California, Irvine - Irvine, CA
ucsb	University of California, Santa Barbara - Santa Barbara, CA
ucsc	University of California, Santa Cruz - Santa Cruz, CA
ufl	University of Florida - Gainesville, FL
uhcl	University of Houston at Clear Lake - Houston, TX
uiowa	University of Iowa - Iowa City, IA
uiuc	University of Illinois - Urbana, IL
ukans	University of Kansas - Lawrence, KA
uminn	University of Minnesota - Minneapolis, MN
umiss	University of Mississippi - University, MS
unlv	University of Nevada at Las Vegas - Las Vegas, NV
upenn	University of Pennsylvania - Philadelphia, PA
usc-cse	University of Southern California - Los Angeles, CA
usf*	University of South Florida - Tampa, FL
usl	University of Southwestern Louisiana - Lafayette, LA
utd	University of Texas at Dallas - Richardson, TX
utenn	University of Tennessee - Knoxville, TN
vanderbilt	Vanderbilt University - Nashville, TN
vpi	Virginia Polytechnic Institute and State University - Blacksburg, VA
wash-state*	Washington State University - Pullman, WA

X25Net Sites (official host names)

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csnet-relay*	Bolt Beranek and Newman Inc. - Cambridge, MA
decwrl*	DEC Western Research Labs - Los Altos, CA
purdue	Purdue University - West Lafayette, IN
rand-relay	Rand Corporation - Santa Monica, CA
rice	Rice University - Houston, TX
tektronix*	Textronix - Beaverton, OR

C-11

ARPANET Sites (primary host names)

berkeley	University of California, Berkeley - Berkeley, CA
bbn-unix	Bolt Beranek and Newman Inc. - Cambridge, MA
cmu-cs-a	Carnegie-Mellon University - Pittsburgh, PA
cornell	Cornell University - Ithaca, NY
harv-10	Harvard University - Cambridge, MA
mit-mc	Massachusetts Institute of Technology - Cambridge, MA
purdue	Purdue University - West Lafayette, IN
rand-unix	Rand Corporation - Santa Monica, CA
rochester	University of Rochester - Rochester, NY
rutgers	Rutgers University - New Brunswick, NJ
su-score	Stanford University - Stanford, CA
utexas-20	University of Texas at Austin - Austin, TX
ucla-cs	University of California, Los Angeles - Los Angeles, CA
udel	University of Delaware - Newark, DE
utah-20	University of Utah - Salt Lake City, UT
washington	University of Washington - Seattle, WA
wisconsin	University of Wisconsin - Madison, WI
yale	Yale University - New Haven, CT

CSNET Facilities (official host names)

Relays:

csnet-relay	Bolt Beranek and Newman Inc. - Cambridge, MA
rand-relay	Rand Corporation - Santa Monica, CA

Service Host:

csnet-sh	Bolt Beranek and Newman Inc. - Cambridge, MA

CIC Host:

csnet-cic	Bolt Beranek and Newman Inc. - Cambridge, MA

IBM

"VAN/Resale Communications Services"

General

1. Do you currently offer a digital data service, or do you plan to offer such a service?

   Yes.

2. When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year?

   Service introduced February, 1982. Subscriber statistics are proprietary information.

3. Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration.

   At this time, the IBM/IN Service utilizes neither satellite nor optical fiber facilities. As these, or other technologies develop cost and operational characteristics that meet our requirements, they will be considered for implementation in our Network. For general configuration information, see the GSA TSP Multiple Award Schedule Price List/Agreement.

Technical Capabilities

4. Is the service packet switched, circuit switched, or both?

   The service is an SNA network. The secondary network, Telenet, is packet switched. See GSA Agreement for technical data.

5. Is a bit rate of 1.5 Mb/s attainable?

   Not at this time on a single circuit.

6. If not, do you plan to offer up to 1.5 Mb/s? When?

   N/A. We cannot disclose future plans.

7. What would be the cost of configuring your existing system for 1.5 Mb/s service?

   N/A.

8. Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions.)

   IBM/IN provides all of the above.

9. What are the error rates for the service?

   The "bit error rate" is that which is tariffed by AT&T for Digital Data Service.

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access?

    All of the above.

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number?

    Both. (800 number is a "back-up" approach).

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port?

    $750/month.

13. Is the service available nationwide? If not, please list major cities where the service is available?

    Our services are available throughout the United States. We currently have major network nodes located in the following cities: Tampa, New York, Boston, Philadelphia, Washington D. C., Atlanta, Chicago, St. Louis, Dallas, Houston, Minneapolis, Los Angeles, San Francisco. In addition, we offer a secondary network for dial asynchronous devices with nodes in approximately 250 U. S. cities.

14. Will nationwide service be available at a future date? When?

    N/A. Expansion of our primary SNA Network is a function of capacity planning and customer demography.

Charges

15. Is your service charge computed on a usage basis?

    Yes.

16. If only fixed monthly charge service is available, would you consider charging on a usage basis with guaranteed minimum fees or other conditions?

    N/A.

17. What is the installation charge associated with the service?

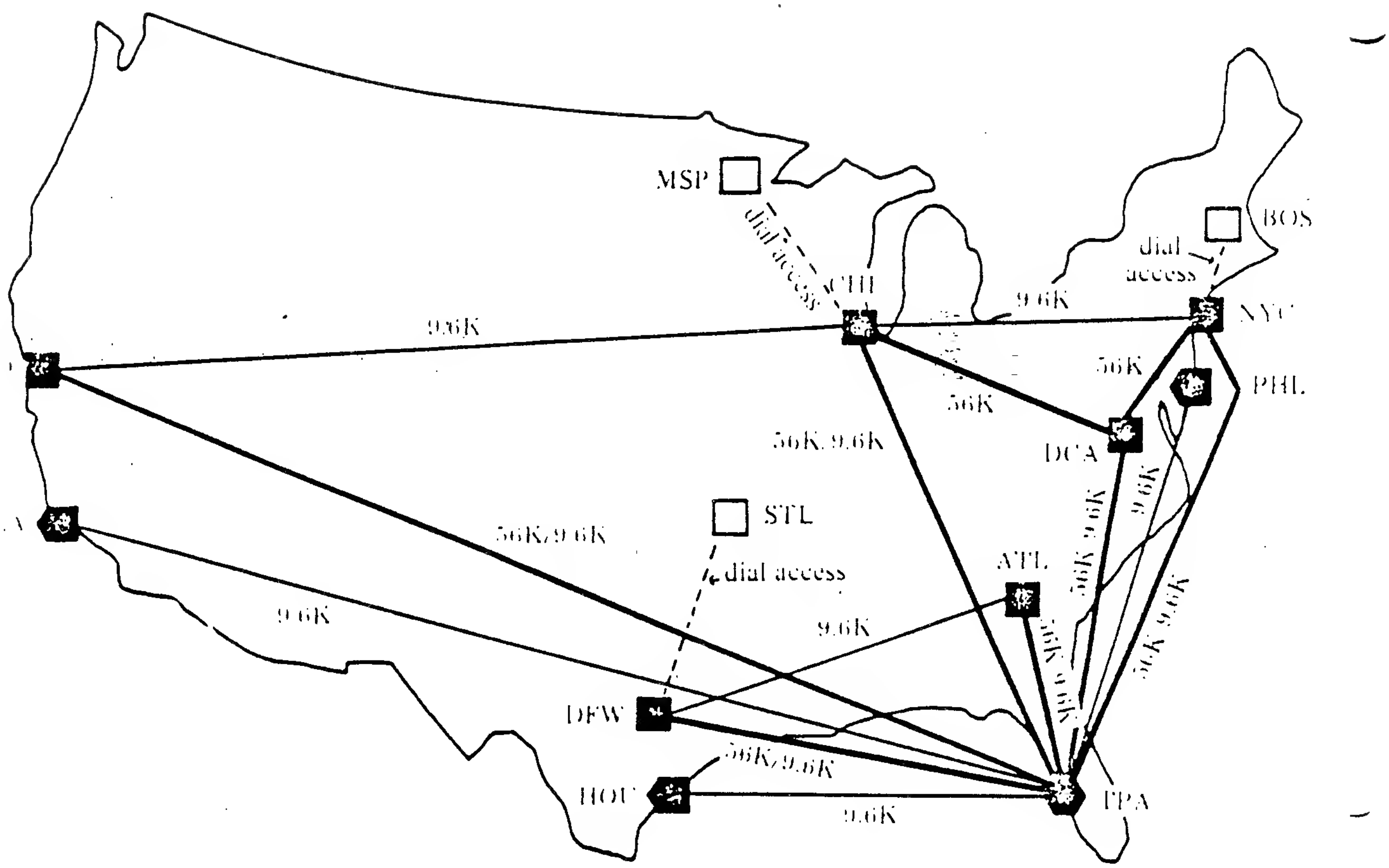
None for the interactive products and products under GSA contract. Two products NS and ENA have installation charges (see IBM IN General Schedule of Charges)

18. How does distance affect service charges?

Distance affects only one product of IBM/IN-Extended Network Attachment (ENA). ENA is an offering whereby IBM/IN will act as a customer's agent in procuring leased lines and modems. No effect otherwise.

19. How do the rates for your service compare with the rates for services offered by vendors who own their own facilities?

Information not available.



LEGEND

COMPUTING CENTERS

FULL SERVICE

COMM.

CONCENTRATOR AND MULTIPLEXOR

176# PORTS

CONCENTRATOR

40# PORTS

NETWORK ACCESS POINT
LOCAL DIAL ACCESS PROVIDED BY "CALL FORWARDING" TO NEAREST COMMUNICATIONS NODE

56 KBPS — WIDE BAND
9.6 KBPS — VOICE GRADE

DIAGRAM II-11-1

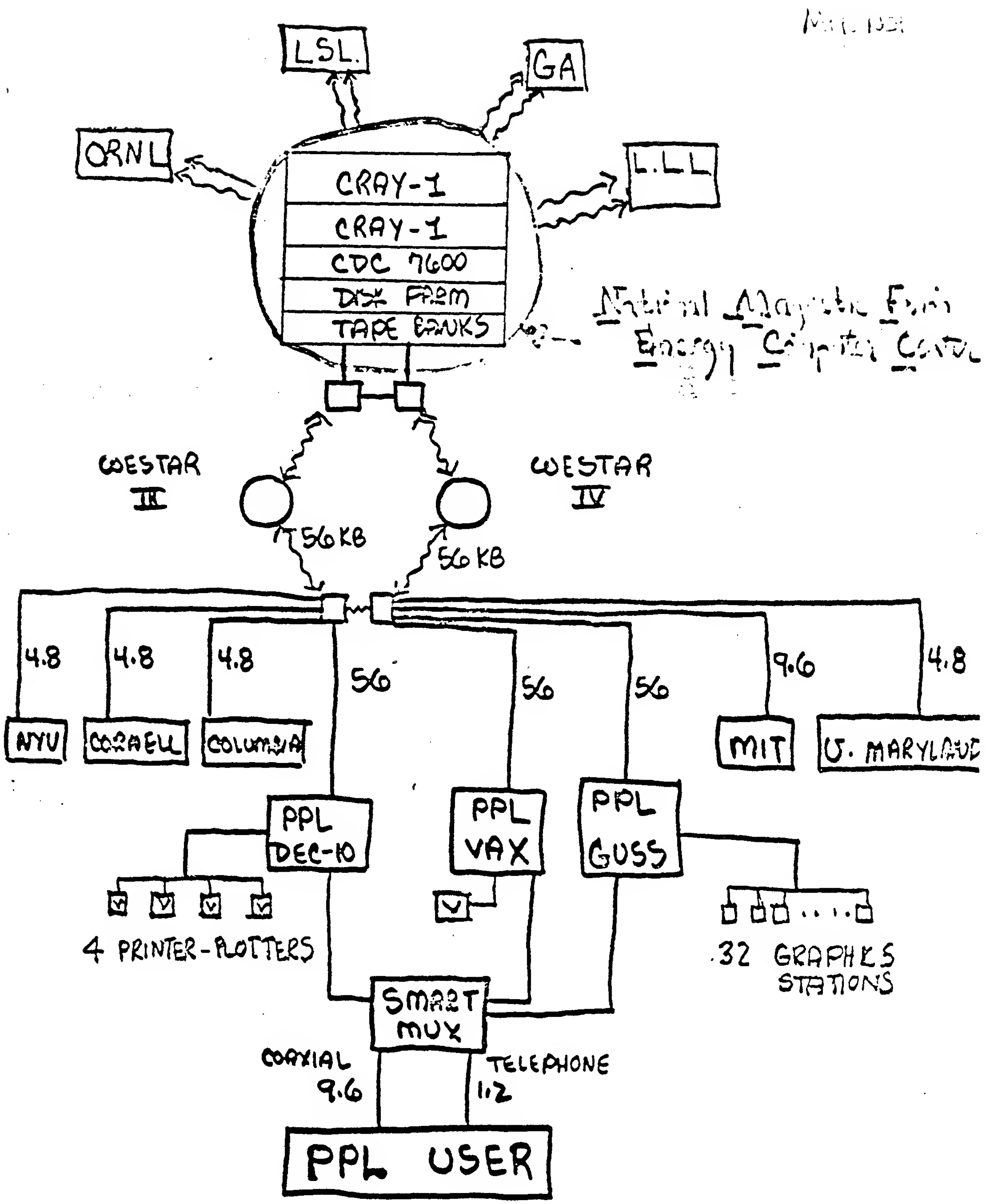


Fig. 2.1 MFECC configuration at Princeton. (From Steve Jardin.)

VAN/Resale Communications Services

General

1. Do you currently offer a digital data service, or do you plan to offer such a service? CURRENT LOCAL LOOPS ARE ANALOG; DDS IN FUTURE MOST LIKELY

2. When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year? INTRODUCED 1981; APPROXIMATELY 200 USERS W/ 1500 DROPS; 300 USERS W/ 5000 DROPS

3. Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration. SATELLITE BACKBONE; NO FIBER OPTICS CURRENTLY; SEE BROCHURE FOR CONFIGURATION

Technical Capabilities

4. Is the service packet switched, circuit switched, or both? PACKET SWITCHED

5. Is a bit rate of 1.5 Mb/s attainable? NO - NOT WITH PRESENT EQUIPMENT

6. If not, do you plan to offer up to 1.5 Mb/s? When? PLAN TO INVESTIGATE FOR USE ON LOCAL AREA NETS

7. What would be the cost of configuring your existing system for 1.5 Mb/s service? UNKNOWN

8. Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions.) YES

9. What are the error rates for the service? BACKBONE: 1×10^{-9}; MEASUREMENTS HAVE EXCEEDED THIS

Access

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access? DEDICATED ACCESS ONLY

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number? N/A

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port? N/A

13. Is the service available nationwide? If not, please list major cities where the service is available? NATIONWIDE, CANADA, ALASKA CURRENTLY. FUTURE PLANS CONSIDER INTERNATIONAL

14. Will nationwide service be available at a future date? When? N/A

Charges

15. Is your service charge computed on a usage basis? ACCESS CHARGE (FIXED) + USAGE (CHARACTERS)

16. If only fixed monthly charge service is available, would you consider charging on a usage basis with guaranteed minimum fees or other conditions? N/A

17. What is the installation charge associated with the service? $1000 FOR HOST LINK; ~~Minimum~~ $425 FOR TERMINAL LINK

18. How does distance affect service charges? DISTANCE INSENSITIVE

19. How do the rates for your service compare with the rates for services offered by vendors who own their own facilities? DEPENDING ON GEOGRAPHICAL DISPURSEMENT; RCA CYLIX IS COST EFFECTIVE ON NON-INTRASTATE NETWORKS

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Mr. L. Daniel O'Neill
Washington, D.C. Counsel
Fenwick, Stone, Davis & West
1424 16th Street Northwest
Suite 101
Washington, DC 20036

John H Williamson
Director
Public Affairs

Dear Mr. O'Neill: November 29, 1983

I'm writing in response to your November 23 letter to Jack Underwood regarding data communications services between super-computers.

Rather than go through your questionnaire, let me summarize that we, as a satellite common carrier, offer wideband data services two ways: through our own commercial earth stations and their respective Central Terminal Offices or through dedicated earth stations sited on the customer's premises. (An alternative is RCA to dedicated -- depending on the location of the customer's premises.)

At present, we can carry data between our CTOs in the following cities: New York (with extensions to Boston, Philadelphia, and Washington), Chicago, Seattle, San Francisco, Honolulu, Los Angeles, Dallas, Houston (with extensions to San Antonio), Atlanta and Miami. By year end 1984, we expect to have Cleveland in the network.

Co-axial cable in the cities mentioned would carry data over telco loops to the computer location from our CTO.

Where business exists that is not in proximity to an RCA Americom CTO, we will install and maintain a dedicated earth station to access the satellite.

Our commercial service offering is 56 Plus, denoting 56 kilobits per second of data. We also market higher rates, principally to U.S. Government users, of 1.544 mbps, and, in one instance, have a 50 mbps circuit ready for future missions of the Space Shuttle.

For our commercial offerings, we require a one-year commitment between RCA stations, and prefer a five-year commitment for dedicated stations.

RCA

Enclosed for your information is a draft of our new 56 Plus brochure. It should provide you with additional details on our service and how it's used. I want to emphasize that this copy has not been fully cleared here at RCA Americom, and therefore should be used for general information only.

Should the NSF wish further details on our service, they (or you) could contact our Manager, 56 Plus Services, J. Preston Brown here in Princeton. His direct number is (609) 734-4141.

Hopefully, this has been of some assistance.

Sincerely,

JHW/djk

Enclosure

cc: J. Preston Brown

VAN/Resale Communications Services

General

1. **Do you currently offer a digital data service, or do you plan to offer such a service?**
   Yes, Telenet is one of the countries largest Public Data Communication Networks.

2. **When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year?**
   Service was started in 1975 by Telenet. In 1979, Telenet was acquired by GTE. There is currently over 1200 host computers tied into the network with over 200,000 terminals. The Telenet network provides local telephone terminal access to over 300 cities here in the United States and to 50 foreign countries. The growth of Telenet has been at a rate of approximately 27% a year.

3. **Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration.**
   The backbone network is made up of some T1 service but mostly it is 56KB terrestrial digital lines. The company is continuing to look into all other available communication methods including satellite, micro wave, and fiber optics. Test are on-going in these areas.

Technical Capabilities

4. **Is the service packet switched, circuit switched, or both?**
   The Telenet Public Data Network is a X.25 packet switched network.

5. **Is a bit rate of 1.5 Mb/s attainable?**
   The network currently has one 1.5 Mb/s or (T1) line installed from New York to Washington. The current network capabilities far exceed the existing demand. However, as traffic increases, the need for additional band width will also increase. Telenet will install T1 service as the user community demands it. There are plans to install additional T1 lines in 1984.

6. **If not, do you plan to offer up to 1.5Mb/s? When?**
   (See Answer Number 5)

7. **What would be the cost of configuring your existing system for 1.5Mb/s service?**
The process of configuration the existing backbone network to a totally 1.5 Mb/s service is a major undertaking costing hundreds of thousands of dollars. The Telenet approach is to build it as we need it.

8. **Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions.)**
All CCITT functions as specified in the X.3, X.28, X.29, and X.25 recommendations are followed by Telenet as well as Telenet ITI parameters. These standards provide for Parity and baud rate, definition, error checking, error correcting, flow control, buffer size, page length, timers, padding (linefeed and tab), etc.

9. **What are the error rates for the service?**
GTE Telent uses a 16th order polynomial code for error detection on the transport network. This code will detect 100 percent of all packets received with 17 or fewer bits in error. It will also detect 100 percent of those containing an odd number of bits in error. With the assumption of an equal probability of any error pattern, the probability of a packet with an even number, greater than 17, of bits in error being detected as having errors is 1 minus .5 to the 16th power. This means that there is less than 1.526 times 10 to the minus 5 chance of the error escaping detection. To determine the probability that any given packet will contain an undedected error, the above number must be mutliplied by the probability that the packet will contain an even number, greater than 17, bits in error. If a purely random error rate of one bit in 10 to the 5th power is assumed, the probability of a 1000 bit error rate of 2.747 times 10 to the minus 43. This number will be even smaller in the case of terrestrial circuits, since errors are not truly random, but rather tend to occur in bursts.

Since packet DTEs will adhere to the above error checking code, the above analysis will hold true, multiplied by the number of retransmissions involved.

When non-packet DTEs are involved, the error detecting ability of the protocol being employed by the DTEs must also be considered. The probability of the data block or packet having an undetected error. Since the specific synchronous protocols and their error detecting capabilities are not known, the calculation cannot be performed.

Access

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access?
Access to the public network can be accomplished by one of three methods.

Public Dial	local telephone call or in-wats number
Private Dial	your own port on the node
Dedicated Access	leased line to the Telenet node

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number?
Local numbers and in-wats, directory enclosed.

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port?
The cost is either a fixed: $290 Class A cities
$510 Class B cities

13. Is the service available nationwide? If not, please list major cities where the service is available?
Service is available nationwide as well as to fifty foreign countries.

14. Will nationwide service be available at a future date? When?
N/A

Charges

15. Is your service charge computed on a usage basis?
The host computer connection is a fixed cost. While the terminal users pays for what he uses. The terminal user pays for connect time and traffic. (characters transmitted/received).

16. If only fixed monthly charge service is available, would you consider changing on a usage basis with guaranteed minimum fees or other conditions?
N/A

17. What is the installation charge associated with the service?
The host computer connection has an installation charge of $1,000. Private dial-in ports have an installation charge of $500.

18. **How does distance affect service charges?**
Generally our charges are distance in sensitive. If the host connection is greater than 100 miles from the nearest Telenet node, then additional charges are added. $125.00 for each 100 miles over the first 100 miles.

19. **How do the rates for your service compare with the rates for services offered by vendors who own their own facilities?**
Telenet rates are price competitive with all other Public Data Network vendors. When compared to leased lines, long-distance, or Wats calls, we generally are less expensive if you are currently paying $2,000 per month or more.

VAN/Resale Communications Services

General

1. Do you currently offer a digital data service, or do you plan to offer such a service? Yes, we offer data services.

2. When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year? 1973; more than 500 organizations and more than 100,000 terminal users; 25% more next year.

3. Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration.
Yes, a few satellite links are installed. Mostly we use Telco facilities which may be either microwave, cable, or fiber.

Technical Capabilities

4. Is the service packet switched, circuit switched, or both? Packet switched; the addition of circuit switched services is planned.

5. Is a bit rate of 1.5 Mb/s attainable? Not currently.

6. If not, do you plan to offer up to 1.5 Mb/s? When? Yes, by Q4 1984.

7. What would be the cost of configuring your existing system for 1.5 Mb/s service? Substantial, no estimates available yet.

8. Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions.) Yes, in the packet switched service we offer today.

9. What are the error rates for the service? After routine error control functions are performed less than one in 10^{12}.

Access

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access?
All three are available.

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number? Principally local numbers, but 800 number access is also available.

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port? $250/mo and $400/mo in large and small cities respectively for up to 2400 bps.

13. Is the service available nationwide? If not, please list major cities where the service is available? Nationwide - i.e. in over 400 cities in the U.S. plus 40 other countries.

14. Will nationwide service be available at a future date? When? N/A

Charges

15. Is your service charge computed on a usage basis? Yes and there is a fixed charge - see attached Rate Summary.

16. If only fixed monthly charge service is available, would you consider charging on a usage basis with guaranteed minimum fees or other conditions? N/A

17. What is the installation charge associated with the service? Typically, $1000 to $2000 depending on capacity installed.

18. How does distance affect service charges? Within the lower 48 states distance is not a factor.

19. How do the rates for your service compare with the rates for services offered by vendors who own their own facilities? Our rates are comparable or less.

ITT United States
Transmission Systems, Inc.

1707 L Street, N.W.
Washington, D.C. 20036
Telephone (202) 293-1470

December 21, 1983

Mr. L. Daniel O'Neill
Washington, D. C., Counsel
Fenwick, Stone, Davis, & West
1424 16th Street, NW., Suite 101
Washington, DC 20036

Dear Mr. O'Neill:

It was good to have the opportunity to talk with you by telephone this afternoon relative to the capabilities of USTS and how we might serve the needs of The National Science Foundation project you are working on.

USTS has constructed, and has in operation, a state-of-the-art microwave system from New York City through the Atlantic Coastal States to Atlanta, Georgia, and from there westward through the Gulf Coastal States to Houston and Dallas. We have approximately twenty-five terminals in major cities along this route. Coupled with this, we can provide access to this network through entrance sites at New York City; West Chester, Pennsylvania; Appomatox, Virginia; Stockbridge, Georgia; and St. Francisville, Louisiana. Although our microwave is an analog system, we can provide wide band digital service. A private line service brochure is enclosed to show you the terminals on our network.

The USTS microwave network is built to exacting specifications designed to provide the highest possible system reliability. I am also enclosing a fact sheet which outlines the features and benefits of our network. Finally, there is enclosed a USTS Voice Channel Performance Summary Specification. This is designed to show you information on a typical channel between New York and Houston.

As I indicated to you, our sister company, ITT World Communications, is in the process of completing a Digital Data Network (DDN). This is essentially a packett switching type network with nodes at New York, Chicago, Atlanta, Dallas, and Los Angeles. This network is scheduled to operate about the middle of 1984.

I believe this provides you with basic information on our capabilities. We stand ready to work with you to provide whatever additional information you require. This would include discussions with our technical representatives.

Thank you for your interest in ITT. We look forward to hearing from you.

Very truly yours,

R W Berry

Robert W. Berry
Regional Manager

RWB:rjs
Enclosure

UNITED STATES TRANSMISSION SYSTEMS, INC.

FACT SHEET

United States Transmission Systems, Inc., is a specialized common carrier. We have constructed a state-of-the-art microwave system from New York City through the Atlantic Coastal States to Atlanta and from there through the Gulf States to Houston and Dallas.

... USTS is an ITT company backed by over 100 years of ITT experience and expertise in telecommunications.

... USTS network is built to exacting specifications designed to provide unmatched quality and reliability at competitive prices.

... Physical elements of the USTS network have been optimized to reduce the effects of environmental, geographical, and climatic conditions.

... USTS network operation, maintenance, and service have been organized to provide immediate response and restoral of all technical problems with particular emphasis on those relating to the customer so as to maintain system availability of 99.998%.

Special features of the USTS network include:

... Space diversity to reduce environmental influences on the transmission path.

... Power supply designed to have triple redundancy.

... Continuous monitoring of all stations, manned or unmanned.

... Maintenance philosophy structured around modular concept.

By way of explanation, the space diversity is used to select the best signal. Redundant equipment arrangements are used to improve reliability which effectively increases the system availability figure.

The triple redundant power supply is built into each station. The prime power source is commercial. Any disruption of the prime source will effect a transfer of load to the station generator. If, for any reason, the generator fails, the load will then be transferred to station batteries capable of a 36-hour full load operation.

All stations, manned or unmanned, are automatically and sequentially polled so as to provide for continuous monitoring for the detection of alarms or changes in status. This insures that prompt action is taken to correct any deficiency.

The modular design of the network equipment components helps to further insure system availability. USTS repairs and/or restores the module or replaceable element through the swap method. This concept is backed by the judicious sparing of all network hardware and a highly trained maintenance force.

UNITED STATES TRANSMISSION SYSTEMS, INC.
1707 L STREET, N. W.
WAHSINGTON, DC 20036

TELEPHONE: (202) 293-1470

USTS

USTS VOICE CHANNEL PERFORMANCE

SUMMARY SPECIFICATION

NEW YORK - HOUSTON

Frequency Range	300 Hz-3400 Hz
Frequency Response	$\pm$0.5 dB
Impendence	600 ohm
Return Loss 300-3400 Hz	14 dB
Return Loss 800-1600 Hz	20 dB
Level Stability	$\pm$0.5 dB
Limiting	+ 10 dBm0
Minimum far-end and near-end crosstalk ratio	75 dB
Minimum go-return crosstalk ratio	54 dB
Maximum Adjacent Channel Disturbance	-65 dBm0p
Maximum Adjacent Channel Distrubance caused by signalling	-65 dBm0p
Basic Noice in Idle System	1700 pWp
Noise in fully Loaded System	2800 pWp
Frequency Stability	$\pm 5.10^{-8}$/over 3 months
Group Delay	300/us over 1000-2600 Hz

USENET STATISTICS AND INFORMATION

Statistics for this month (3/84):

829 Usenet sites
171 net.all newsgroups
223 articles per day (average over last 2 weeks).

USENET SITES

This list is based on the April map distribution:

COLLEGES, UNIVERSITIES

Albert Einstein College of Medicine, Scientific Computing Center
Arizona State University
Athabasca University Computing Services
Bradley University, Text Processing
Brigham Young University, Computer Science Dept.
Brown University
Brown University, Dept. of Computer Science
Brown University, Engineering Dept.
Carleton University, Department of Systems Engineering
Case Western Reserve University, Department of Neurology
Case Western Reserve University, Dept. of Computer Engineering
Chalmers University of Technology, Dept. of Computer Science
Colorado State Univ.
Columbia University, Biological Sciences Dept.
Columbia University, Dept. of Medicine
Computational Science Department, University of St. Andrews
Computer Centre microlab, Reading University
Cornell Univ Electrical Engineering Dept.
Cornell University, Computer Aided Design Instructional Facility
Cornell University, Dept. of Computer Science
Dalhousie University, Deptartment of Mathematics, Statistics, and Computing Scienc
Dalhousie University, Statistics Group
Dartmouth College, Kiewit Computation Center
Delft University of Technology, Department of Electrical Engineering
Delft University of Technology, Department of Mathematics and Informatics
Dept. of Computer Science, Reading University
Duke University Medical Center, Dept. of Physiology
Duke University, Computer Science Department
Emory University, Computing Center
Emory University, Dept. of Math and Computer Science
Florida Atlantic University, College of Buisiness and Public Administration, Compu
Harvard University, Center for Research in Computing Technology, Aiken Computation
Harvard University, School of Public Health
Harvard University, Science Center
Harvard University, William James Hall
Helsinki University of Technology, Laboratory for Information Processing Science
Heriot-Watt University, Computer Science Dept., MMI Research Group
Heriot-Watt University, Dept. of Computer Science
Indiana University, Computer Science Department
Johns Hopkins University, Applied Physics Laboratory

Melbourne University, Dept. of Computer Science
Memorial University of Newfoundland, Dept. of Computer Science
New York University, Courant Institute
New York University, Courant Mathematics & Computing Laboratory
North Carolina Educational Computing Service, Triangle Universities Computing Cent
North Carolina State University, EE Department
Ohio State University, Laboratory for DataBase System Research
Oregon State University, Computer Science Dept.
Presbyterian-Univ. of Pennsylvania Med. Ctr., Dept. of Cardiology
Princeton University, Dept. of Astrophysical Sciences
Princeton University, Dept. of EECS
Princeton University, Dept. of Statistics
Princeton University, EECS Department
Princeton University, EECS Dept.
Purdue University, Computing Center
Purdue University, Dept. of Computer Science
Purdue University, Dept. of Computer Sciences
Purdue University, Electrical Engineering Dept.
Purdue University, Physics Department
Purdue University, Potter Engineering Center
Reed College
Rochester Institute of Technology, School of Computer Science and Technology (Cine
Rockefeller University
Rockefeller University, Dept. of Neurobiology
SUNY at Stony Brook, Dept. of Computer Science
Saint Joseph:s University, Dept. of Math/Computer Science
Scripps Institution of Oceanography, The Marine Physical Laboratory
Simon Fraser University, Computer Science Lab
Southern Methodist University, Dept. of Computer Science and Engineering
St. Olaf College, Academic Computer Center
State University of New York at Buffalo, Computer Science Department
Tampere University of Technology, Computer Science Laboratory
The Pennsylvania State Univ., Computer Science Dept.
The Pennsylvania State University, Computer Science Dept.
The University of Oklahoma, College of Engineering
The University of Rochester
The University of Rochester, Dept. of Electrical Engineering
Twente University of Technology, Dept. of Electr. Engg.
Univ. of California, Berkeley, CAD Group
Univ. of California, Berkeley, Computer Center
Univ. of California, Berkeley, Computer Systems Research Group
Univ. of California, San Diego
Univ. of California, San Diego, Audio Research Lab.
Univ. of California, San Diego, Cognitive Science Laboratory
Univ. of California, San Diego, Computer Center
Univ. of California, San Diego, Dept. of Chemistry
Univ. of California, San Diego, EECS Dept.
Univ. of California, San Diego, Phonetics Lab
Univ. of Central Florida, Computer Science Dept.
Univ. of Illinois, Urbana-Champaign, Computer Services Office
Univ. of Illinois, Urbana-Champaign, Dept. of Computer Science
Univ. of Illinois, Urbana-Champaign, Eye Movement Lab, Center for the Study of Rea
Universitaet Dortmund, Informatik / IRB
Universiteit van Amsterdam, Afd. Psychologie
Universiteit van Amsterdam, Vakgroep Informatica
University of Alberta, Dept. of Computer Science

University of Alberta, Dept. of Computing Science
University of Arizona, Dept. of Computer Science
University of Bradford
University of British Columbia, Dept. of Computer Science
University of British Columbia, Dept. of Medical Genetics
University of Caifornia, Berkeley
University of Calgary, Computer Science Research Group
University of California, Berkeley
University of California, San Francisco, Computer Graphics Lab.
University of Cincinnati, Dept. of Electrical and Computer Eng.
University of Colorado, Boulder
University of Colorado, Cooperative Institute for Research in Environmental Scienc
University of Copenhagen, Indre By-terminal
University of Copenhagen, Institute of Datology
University of Copenhagen, Institute of Datology +DIKU
University of Copenhagen, Institute of Datology +RECKU
University of Delaware
University of Edinburgh, Computer-Aided Architectural Design
University of Edinburgh, Dept. of Artificial Intelligence
University of Edinburgh, Dept. of Electrical Engineering
University of Edinburgh, Machine Intelligence Research Unit
University of Florida, Department of Chemical Engineering
University of Florida, Gainesville, Computer Graphics Research Group
University of Glasgow, Computing Science Dept
University of Hawaii, Planetary Geosciences
University of Illinois at Urbana-Champaign, Dept. of Mechanical and Industrial Eng
University of Illinois, Computer Systems Group
University of Illinois, Coordinated Science Lab
University of Kent
University of Kent (Teaching VAX750)
University of Kent, Administration
University of Kent, Electronics Laboratory
University of London, Westfield College, Computer Science Dept.
University of London, Westfield College, Computer Unit.
University of Maryland, College Park, Computer Science Dept.
University of Maryland, College Park, EE Dept.
University of Maryland, Computer Vision Lab
University of Melbourne, Department of Computer Science
University of Michigan, Department of Radiology, Henry Ford Hospital
University of Michigan, Dept. of Electrical and Computer Engineering
University of Minnesota, Computer Science Department
University of Minnesota, University Computer Center
University of New Mexico
University of New Mexico, College of Engineering
University of New Mexico, Computer Center
University of North Carolina at Charlotte (UNCC)
University of North Carolina, Dept. of Computer Science
University of Oregon
University of Pennsylvania, Physics Dept. Solid State theory PDP-11/23
University of Pittsburgh, Computer Science Dept.
University of Pittsburgh, Decision Systems Laboratory
University of Pittsburgh, School of Information Science
University of Rochester, Computer Science Dept.
University of Saskatchewan, Academic Computing Services
University of Saskatchewan, Linear Accelerator Lab.
University of Stockholm

University of Sydney, Basser Dept. of Computer Science
University of Tampere, Computer Science Division
University of Texas Medical Branch, Office of Academic Computing and Biostatistics
University of Texas, Astronomy/McDonald Observatory
University of Texas, Austin, Computer Science Dept.
University of Texas, Computation Center
University of Toronto, CSRG
University of Toronto, Computer Systems Research Group
University of Toronto, Computing Services Systems Group
University of Toronto, Engineering Computing Facility
University of Toronto, Faculty of Dentistry, Biometrics Section
University of Toronto, Zoology Dept.
University of Utah, Computer Science Dept.
University of Victoria
University of Virginia, Computer Science Department
University of Washington, Dept. of Computer Science
University of Washington, Dept. of Geophysics
University of Washington, Seattle; Stat., Biostat., and Math Depts.
University of Waterloo
University of Waterloo, Arts Computing Office
University of Waterloo, Centre for the Evaluation of Communication-Information
University of Waterloo, Computer Graphics Laboratory
University of Waterloo, Dept. of Computer Science
University of Waterloo, Math Faculty Computing Facility
University of Wisconsin, Computer Sciences Dept.
University of Zuerich, Institut fuer Informatik
VA Wadsworth Medical Center/UCLA Dept. of Neurology
Vrije Universiteit Brussel, Medische Informatica
Vrije Universiteit, Afd. Informatica
Wang Institute of Graduate Studies
Washington University, Computer Systems Laboratory
Washington University, Department of Physics
Washington University, Dept. of Computer Science
Yale University

INDUSTRIAL SITES

A/S Kongsberg Vaapenfabrikk, Department UDM4
AMPEX, Data Systems Division
AT&T - ISL Digital Data Systems Development Dept.
AT&T Bell Laboratories
AT&T Bell Laboratories, Allentown, Computer Center
AT&T Bell Laboratories, Business Analysis Systems Center
AT&T Bell Laboratories, Computer Center
AT&T Bell Laboratories, Computing Technology Research Lab
AT&T Bell Laboratories, DATAKIT Project
AT&T Bell Laboratories, Data and Control Terminals Design Dept.
AT&T Bell Laboratories, Dept. 55515
AT&T Bell Laboratories, Electronic Power Systems Laboratory
AT&T Bell Laboratories, Indian Hill New Switching Services
AT&T Bell Laboratories, Interactive Comp. Systems, Res. Dept.
AT&T Bell Laboratories, Lab 5923
AT&T Bell Laboratories, Languages and Progaramming Environment Dept.
AT&T Bell Laboratories, Murray Hill Computer Center
AT&T Bell Laboratories, Murray Hill Technical Library
AT&T Bell Laboratories, NEMOS Bysen Machine

AT&T Bell Laboratories, Network Service Center System Development Group
AT&T Bell Laboratories, Operating Systems Group
AT&T Bell Laboratories, Physics Research
AT&T Bell Laboratories, RMAS project
AT&T Bell Laboratories, Switching Control Center Systems
AT&T Communications, National Technical Support Center
AT&T Consumer Products
AT&T Information Systems
AT&T Information Systems Laboratories
AT&T Information Systems Labs
AT&T Information Systems, Holmdel General Purpose D
AT&T Technologies
AT&T Technologies - SYSCTR, Network Software Center
AT&T Technologies, Hawthorne Works
AT&T Technologies, Kansas City Works
AT&T Technologies, Southwestern Region Engineering
AT&T Technologies, Warrenville Data Center
AT&T Technologies/AT&T Bell Laboratories, Atlanta Cable Works
AT&T Technologies/Bell Laboratories, Atlanta Cable Works
Advanced Digital Engineering Corporation
Advanced Micro Devices, Micro Computer Systems
Affinitec
Altos Computer Systems
Altos Regional Office (Dallas)
Ampex Corporation
Ampex Corporation, Audio Video Systems Division
Ann Arbor Terminals
Apollo Computer
Applied Technology Ventures, Inc.
Automatix Incorporated
Axiom Technology
BBN Communications Corp.
Ballistics Research Lab
Banyan Systems, Inc.
Beehive International
Bell Communications Research, Inc.
Bell of Pennsylvania
Brignoli Models, Inc.
Brookhaven National Labs
Bull Centre de Recherches
Bull Sems
Bunker Ramo Corp., Information Systems Division
Bunker Ramo Electronic Systems
Burroughs Corp., Advanced Systems Group - Boulder
Burroughs Corporation, Advanced Systems Group
CAE Systems, Inc.
CERN
CNAM - Laboratoire d'Informatique
CWI (Center for Mathematics and Computer Science)
Cadlinc, Inc.
Cadmus Computer Systems
Calculon Corporation
California Institute of Technology
Callan Data Systems
Celerity Computing, Inc.
Center for Seismic Studies

Central Services Organization
Central Services Organization, Inc.
Chesapeake & Potomac Telephone Company
Christian Rovsing, CAD dept.
Cii Honeywell Bull
Clarke County Health Dept., Northeast Health District
Claus Kettel Ingeni|rfirma A/S
Community College Technology Department.
Community Dialysis Center
Compion Corp.
Compugraphic Corp.
Computer Consoles Inc., Telephone Systems Division
Computer Consoles, Inc.
Computer Consoles, Inc., Office Systems Group
Computer Corporation of America
Computer Development Inc.
Computer Thought Corporation
Computerized Office Services, Inc.
Control Automation
Convex Computer Corporation
Cretan Research Center
Cyb Systems, Inc.
Cygnet Systems, Inc.
Data General Corp.
Databaskonsult DBK AB
Davis Polk & Wardwell
Decision Resources, Inc.
Defence and Civil Institute of Environmental Medicine
Denelcor, Inc.
Dept. of Computer Systems, Royal Institute of Technology
Dept. of Physics IV, Royal Institute of Technology
Dept. of Solid State Physics, Royal Institute of Technology
Develcon Electronics Ltd.
DigiGraphic Systems Corp.
Digital Equipment AB
Digital Equipment Corp.
Digital Equipment Corp., Commercial Languages and Tools Group
Digital Equipment Corporation, Western Research Lab.
Dual Systems Corp., Engineering Department System
Durham Veterans Administration Medical Center
ENEA DATA Svenska AB
Elektrondata AB
Exxon Office Systems
FRI
Fairchild Lab for AI Research
Ferranti Cetec Graphics Ltd.
FileNet Corp.
Ford Aerospace & Comm. Corp, WDL Division
Fortune Systems Corp.
G.C.A. Corporation, Tropel Division
GEC Research Laboratories, Hirst Research Center
GenRad
GenRad, Inc.
GenRad, Inc., Production Test Divison
Genix, Ltd.
Georgia Institute of Technology, School of Information and Computer Science (ICS)

Gordon L. Burditt
HIO de Maere
Harvard Medical School
Harvard School of Public Health, Health Sciences Computing Facility
Health Systems International
Hendrix Electronics, Inc.
Heurikon Corporation
Hewlett Packard
Hewlett Packard Co.
Hewlett Packard Labs
Hewlett-Packard Corp.
Hewlett-Packard Corp., Personal Computer Division
Hewlett-Packard Denmark
Hewlett-Packard Fort Collins Systems Division
Hewlett-Packard Labs, Computer Research Center
Hewlett-Packart Logic Systems Division
High Altitude Observatory/NCAR
Hospital Systems Study Group
Hughes Aircraft Company, Space and Communications Group
Human Computing Resources Corp.
INTERACTIVE Systems Corporation
INTERACTIVE Systems Corporation
ITT Advanced Technology Center
ITT Programming Technology Center
ITT Programming Technology and Development Center
ITT Telecom, Business and Consumer Communications
ITTDCD
Ikonas Graphics Systems, Inc.
Imperial Software Technology
In Touch Ministries
Industrial Electronics Development Laboratory, General Electric
InfoPro Systems
Institut National de Recherche en Informatique et Automatique
Institut de Recherche et Coordination Acoustique/Musique
Institute for Computer Applications in Science and Engineering, (ICASE)
Institute for Social Research
Instituto Elaborazione Informazione Consiglio Nazionale Ricerche
Integrated Microcomputer Systems, Inc.
Integrated Office Systems
Intel
Intel Corp.
Intel Corporation
Intel Corporation Special Systems Operation
Intelligent Decisions, Inc.
Interactive Systems Corporation
Interactive Systems Corporation
Intermetrics, Inc
International Institute for Applied Systems Analysis (IIASA)
International Technical Seminars
Investment Futures, Inc.
Islenet Incorporated
Jerq Research Labs
John Fluke Manufacturing Co., Inc.
KU IVV Wis- en Natuurkunde fac.
Kitt Peak National Observatory
Knowledge Engineering Inc.

Korean Advanced Institute of Science and Technology
Lachman Associates, Inc.
Lamont-Doherty Geological Observatory
Lawrence Livermore National Laboratory, S-1 Project
Linus-Pauling Institute
Logica Limited
Logica Svenska AB
Looking Glass Software
Los Alamos National Laboratory
Luleaa Institute of Technology, Dept. of Computer Technology
Lund Institute of Technology, Dept. of Computer Technology
MDS Qantel Corporation
METROLOGIE
MIT Laboratory for Computer Science
MIT, EECS Dept., Undergraduate Computer Facility
MITRE Corporation
MITRE, Dept. D75 Computing Facility
Man-Vehicle Systems Research Division, NASA - Ames Research Center
Management Decisions Development Corp.
Massachusetts Computer Corporation
Mayfield Senior School
Medical Systems Development Corporation
Megatest Corp.
Mellon Institute, Computer Engineering Center
Metheus Corp.
Metric A/S
Michigan Bell Telephone Company
MicroElectronics Center of North Carolina
Microsoft
Microsoft, Santa Cruz Operations
Microtel Pacific Research
NBI, Inc.
NCR Corp., Engineering & Manufacturing - Columbia Division
NIKHEF-K
National Aeronautical Establishment, National Research Council of Canada
National Institute of Health
National Semiconductor Corp., Microprocessor Systems Division
Naval Ocean Systems Center
New Mexico Institute of Mining and Technology
New York Blood Center
North Carolina Educational Computing Service
Olivetti Advanced Technology Center
Olivetti Software Factory
Onyx Systems, Software Engineering
Optisoft
Oregon Graduate Center, Dept. of Computer Science and Engineering
PAR Technology Corp.
Pacific Bell
PacketCable, Inc.
Patil Systems, Inc.
Periphere Computer Systeme GmbH
Periphonics Corp.
Perkin-Elmer Corp., Data Systems Group, Customer Service
Perkin-Elmer, Tech. Systems Division
Philips Laboratories
Philips Natlab Geldrop

Philips S&I/T&M/PMDS
Plexus Computers
Pratt and Whitney Aircraft
Projet SOL - INRIA
Proper UNIX
Quantime Corporation
Quantime Ltd., London. U.K.
Qubix Graphic Systems, Inc.
Qume Corp.
Radio Shack National Account Support Group
Raytheon Co., MSD
Raytheon Submarine Signal Division
Research Triangle Institute
Resource Dynamics, Inc.
Rijksinstituut voor Volksgezondheid
Root Computers Ltd.
SARA
SRI International
Scandia Metric
Scientific Machines Corp.
Sequent Computer Systems, Inc.
Shell Development Co., Physics & Computer Science Dept.
Shell Development Computer Science Department
Siemens AG, ZTI SOF 41
Siemens Corp.
Siemens Corp., Research and Technology Laboratory
Software Innovations, Inc.
Software Support Center, Boeing Aerospace Co.
South Central Bell?
Southern Bell
Southern Bell T & T
Specialized Systems Consultants
Standard Telecommunication Labs. Ltd.
Statens Byggeforskningsinstitut
Statskonsult AU AB
Stichting Informatiecentrum voor Scholenbouw
Storage Technology Corp.
Sun Microsystems Inc.
Sun Microsystems, NY District
Swed. Telecommunications Authority, dept. FLS, @ Farsta
Symplex Communications Corp.
System Development Corp., a Burroughs Company
System Development Corporation, Research and Development Computer Facility
Sytek
TNO - IBBC
TRW, Inc.
TYX Corporation
Tandy/Radio Shack
Taurus Technology Ltd., London
Tektronix
Tektronix AB
Tektronix Engineering Computing Systems Business Unit
Tektronix, Inc.
Tektronix, Inc., Communications Network Analyzers Business Unit
Tektronix, Inc., Information Display Division
Tektronix, Inc., Instruments Group

Tektronix, Inc., Microprocessor Development Products Business Unit
TeleLOGIC AB. LOG-H
Telefon AB L M Ericsson
Telematic Products, Inc.
Teletype Corporation, R & D
Teli AB, avd. I/U
Teltone Corporation
The Boston Globe, Information Services
The Consumer Financial Institute
The Foxboro Co.
The Instruction Set Ltd., London. U.K.
The Rand Corporation
The Wollongong Group
Thinking Machines Corp.
Trigraph Inc.
True Basic, Inc.
Tymshare Inc.
U.S. Geological Survey
Ungermann-Bass
UniSoft
Uniq Computer Corp.
Varian Instruments
Verdix Corp., Western Operations
Vortex Technology
Western General Hospital, MRC Clinical And Population Cytogenics Unit
Western Union
Xerox Corp., Computer Aided Analysis
Xerox, Henrietta
Zaiaz Communications, Inc.
Zehntel Inc.
Zehntel Productions Services
Zilog

VAN/Resale Communications Services

General

1. Do you currently offer a digital data service, or do you plan to offer such a service? We currently offer such a service.

2. When was your service introduced? How many users currently subscribe to your service? How many additional subscribers do you expect in the next year? 1981; 125 customers with their own subscribers. In FY 84, we expect to have 225 customers and their subscribers.

3. Does the service utilize satellite facilities? Optical fiber facilities? Please describe its general configuration. Sat. service: planned development 1985; Optical fiber used only in future telephone transport.

Technical Capabilities

4. Is the service packet switched, circuit switched, or both? packet switched

5. Is a bit rate of 1.5 Mb/s attainable? no

6. If not, do you plan to offer up to 1.5 Mb/s? When? yes, in 1985

7. What would be the cost of configuring your existing system for 1.5 Mb/s service? 25 million

8. Are intelligent functions, including error control, flow control, and speed conversion, performed? (Please indicate functions.) Our service has speed conversion, protocol conversion, flow control, error control and x.25 protocol.

9. What are the error rates for the service? error rates: .004

Access

10. Is access to the service achieved through public dial-up? Private dial-up? Dedicated access? Public Dial up, dedicated and private dial up

11. If the service can be accessed through public dial-up, how is this achieved? Through a local number? an 800 number? Public Dial up is achieved via an assigned local telephone number. We also provide service accessed via an 800 WATS line.

12. If the service can be accessed through private dial-up, what is the cost of the dedicated access port? High density access, monthly charges: $250.00 - Med. Density $=350

13. Is the service available nationwide? If not, please list major cities where the service is available? yes. We have access in 279 cities and inclusion of local calling areas raises total number of cities to 350.

14. Will nationwide service be available at a future date? When? 1/1/84

Charges

15. Is your service charge computed on a usage basis? yes

16. If only fixed monthly charge service is available, would you consider charging on a usage basis with guaranteed minimum fees or other conditions?

17. What is the installation charge associated with the service?

18. How does distance affect service charges? Mileage to the nearest network entry point for transmission facilities is based on AT&T mileage schedules.

19. How do the rates for your service compare with the rates for services offered by vendors who own their own facilities? 1) We have a greater number of "physical locations" for network access, as compared to other competitive VANS. 2) we have a lower price (i.e., hourly rates) and 3) we have great reliability, customer service operations, and better, more cost effective data transport services.

TABLE 1

RATES AND CHARGES OF MAJOR VALUE ADDED NETWORK CARRIERS

Charges According to Access Type and Other Charges	GTE Telenet		Control Data Corporation Control Data Shared Network		TYMNET		ADP AUTONET	
Public Dial-Up (bits/second)[1]	(110-1200b/s)		(300b/s)	(1200b/s)	(110-1200b/s)		(110-300b/s)	(1200b/s)
Hourly-via local telephone number	$3.90-6.90[3]		$4.50-8.50[3]	$7.00-11.00[3]	$4.25-$9.25[3]		$1.00-3.00[3]	$1.50-4.00[3]
Hourly-via IN-WATS (800) number	$ 23.00			$ 26.00	$ 18.75			$26.00
							+ $500 monthly subscription	
Private Dial-Up (bits/second)[2]	(110-1200b/s)		(300b/s)	(1200b/s)	(110-2400b/s)		(110-300b/s)	(1200b/s)
Installation	$ 500		$ 500	$ 500	$ 500		$ 500	$ 500
Monthly	$260-460[3]		$400-500[3]	$600-700[3]	$ 250-400[3]		$ 250	$ 275
Dedicated Access Facilities (speed)	(110-1200b/s)	(56Kb/s)	(300b/s)		(110-2400b/s)		(110-1200b/s)	
Installation	$1000	$1000	$ 1500		$ 500		$ 1000	
Monthly	$ 550	$1400	$ 1500[4] (8 ports)		$ 175-350[4]		$ 600	
Host Interface*					(110-1200b/s)			
Asynchronous (speed/# of lines)	N/A		(8 lines)	(32 lines)	(8 lines)	(126 lines)	(32 lines)	(80 lines)
Installation	N/A		$ 1700	$ 2000	$ 1000	$ 2600	$ 1000	$ 1000
Monthly	N/A		$ 1900	$ 3000	$ 1500	$ 6300	$ 1800	$ 3400
Synchronous (speed)	N/A		(4800b/s)	(9600b/s)	(2400-4800b/s)	(56Kb/s)	(2400b/s)	(9600b/s)
Installation	N/A		$ 1000	$ 1000	$ 1000	*[5]	$ 1000	$ 1000
Monthly	N/A		$ 1100	$ 1500	$ 1100	*[5]	$ 850	$ 1500
Network Usage Charge	$1.55/thousand packets		N/A		$0.05/ thousand characters		$0.03/thousand characters	
Monthly Account Charge	$140		N/A		N/A		$100	
Minimum Monthly Use Charge	N/A		$ 3500		N/A		N/A	

NOTES TO TABLE

[1] Does not include local telephone company charges.

[2] Does not include local telephone company or DTS provider charges, either of which could be used to access the VAN carrier's network. For local telephone company charges, see text. For DTS charges, see last column of Table.

[3] Depending on whether city is "high density" (lowest charge) or "low density" (highest charge). The figures shown do not indicate time of day or volume discounts. Most VAN carriers offer both.

[4] Does not include leased line between dedicated access equipment on customer premises and city on VAN carrier's network. VAN carrier will provide leased line at 115% of common carrier rate.

[5] Special quotation.

[6] Does not indicate time of day or volume discounts.

[7] Charged per minute.

... who in turn provide service to a number of users with terminals. The VAN carrier

TABLE 1 (continued)

Charges According to Access Type and Other Charges	AT&T Information Systems Net 1000 Service		IBM Information Network	RCA Americom	Digital Termination System
Public Dial-Up (bits/second) [1]	(0-1200b/s)	(2400-4800b/s)	(9600-56,000b/s)	N/A	N/A
Hourly - Local Access	$ 4.20[6,7]	$ 9.60[6,7]	$7.00	N/A	N/A
Hourly - WATS Access	N/A	N/A	?	N/A	N/A
Private Dial-Up (bits/second)[2]	(0-1200b/s)	(2400-4800b/s)	(9600-56,000b/s)	(56,000b/s)	(56,000b/s)
Installation	$ 450	$ 450	?	?	N/A
Monthly	$ 275	$ 700	$ 750	$5,400	$3,000
Dedicated Access Facilities (speed)	(0-2400b/s)	(4800-9600b/s)	(9600-56,000b/s)	(56,000b/s)	(1.5Mb/s)
Installation	An - $450 Dig- $300	An - $ 450 Dig- $ 300	$ 300 - 1,000	$15,000/earth station	$3,000
Monthly	An - $485 Dig- $410	An - $1,110 Dig- $ 810	$ 450[4]	$15,000	$3,000
Host Interface*					$10,000 termination charge reduced 1/60 / month
Asynchronous (speed/# of lines)	N/A		N/A	N/A	N/A
Installation	N/A		N/A	N/A	N/A
Monthly	N/A		N/A	N/A	N/A
Synchronous (speed)	N/A		(9600-56,000b/s)	N/A	N/A
Installation	N/A		?	N/A	N/A
Monthly	N/A		$ 200 - 300	N/A	N/A
Network Usage Charge	2-way interactive: $1.75/thousand packets 1-way - $1.55-2.30/100Kchar.		$0.03-.07/kilochar.[7]	N/A	
Monthly Account Charge	N/A		N/A	N/A	
Minimum Monthly Use Charge	N/A		$ 200	N/A	

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3 Depending on whether city is "high density" (lowest charge) or "low density" (highest charge). The figures shown do not indicate time of day or volume discounts. Most VAN carriers offer both.

4 Does not include leased line between dedicated access equipment on customer premises and city on VAN carrier's network. VAN carrier will provide leased line at 115% of common carrier rate.

5 Special quotation.

6 Does not indicate time of day or volume discounts.

7 Charged per minute.

*Host Interface refers to charges to customers of the VAN carrier who in turn provide service to a number of users with terminals. The VAN carrier bills the Host; the Host bills its users according to its own rate schedule.